OFFICE OF
BUILDING TECHNOLOGY,
STATE AND COMMUNITY PROGRAMS

# Residential Provisions of the 2000 International Energy Conservation Code

U.S. Department of Energy
Office of Codes and Standards

Produced by the Pacific Northwest National Laboratory

# Structure of the IECC

- Chapter 1 Administrative & Enforcement
- Chapter 2 Definitions
- Chapter 3 Design Conditions
- **Chapter 4 Residential - Systems Analysis**
- **Chapter 5 Residential - Component Performance**
- **Chapter 6 Simplified Prescriptive**
- Chapter 7 *ASHRAE 90.1* Reference
- Chapter 8 Design by Acceptable Practice for Commercial Buildings
- Chapter 9 Referenced Standards

# Chapter 4

## “Residential Building Design by Systems Analysis and Design of Buildings Utilizing Renewable Energy Sources”

# Systems Analysis

- Hourly annual energy use simulation to demonstrate that the proposed building uses equal or less energy compared to a “standard” building
- Usually done through complex software analysis
- Includes credit for renewable energy

# Chapter 5

## "Residential – Component Performance Approach"

- Scope
  - Applies to Type A-1 and A-2 residential buildings
  - Exception
    - Portions of the building envelope that do not enclose conditioned space

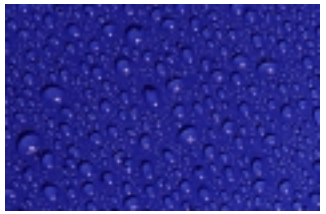
# Requirements and Compliance Approaches

- Building envelope requirements *(Section 502.1)*
- Building mechanical systems and equipment *(Section 503)*
- Service water heating *(Section 504)*
- Electrical power and lighting *(Section 505)*

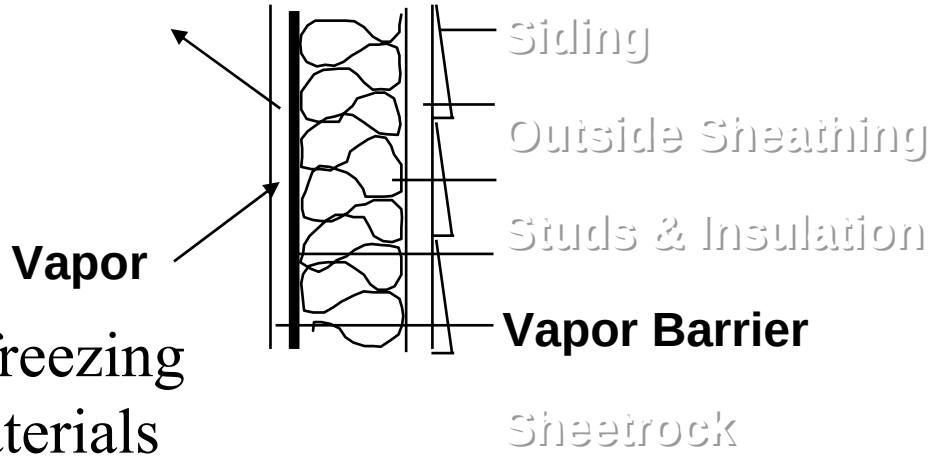
# General Requirements

- Moisture control
- Recessed lighting fixtures
- Air leakage
- Fenestration solar heat gain coefficient

# Moisture Control



- Moisture Control
  *(Section 502.1.1)*
  - Exceptions
    - Where moisture or its freezing will not damage the materials
    - Hot and humid climates
    - Other approved means to avoid condensation
- Masonry Veneer
  *(Section 502.1.2)*



# Recessed Lighting Fixtures
*(Section 502.1.3)*

- Type IC rated, with no penetrations between the inside of the recessed fixture and ceiling cavity (sealed and caulked)
- Type IC or non-IC rated, installed inside a sealed box of ½" gypsum wallboard or other assembly manufactured for this purpose
- Type IC rated, in accordance with ASTM E 283 to be an “Air-Tight” enclosure

# Examples of Recessed Lighting Fixtures


# Example of IC Label

# Air Leakage
*(Section 502.1.4)*

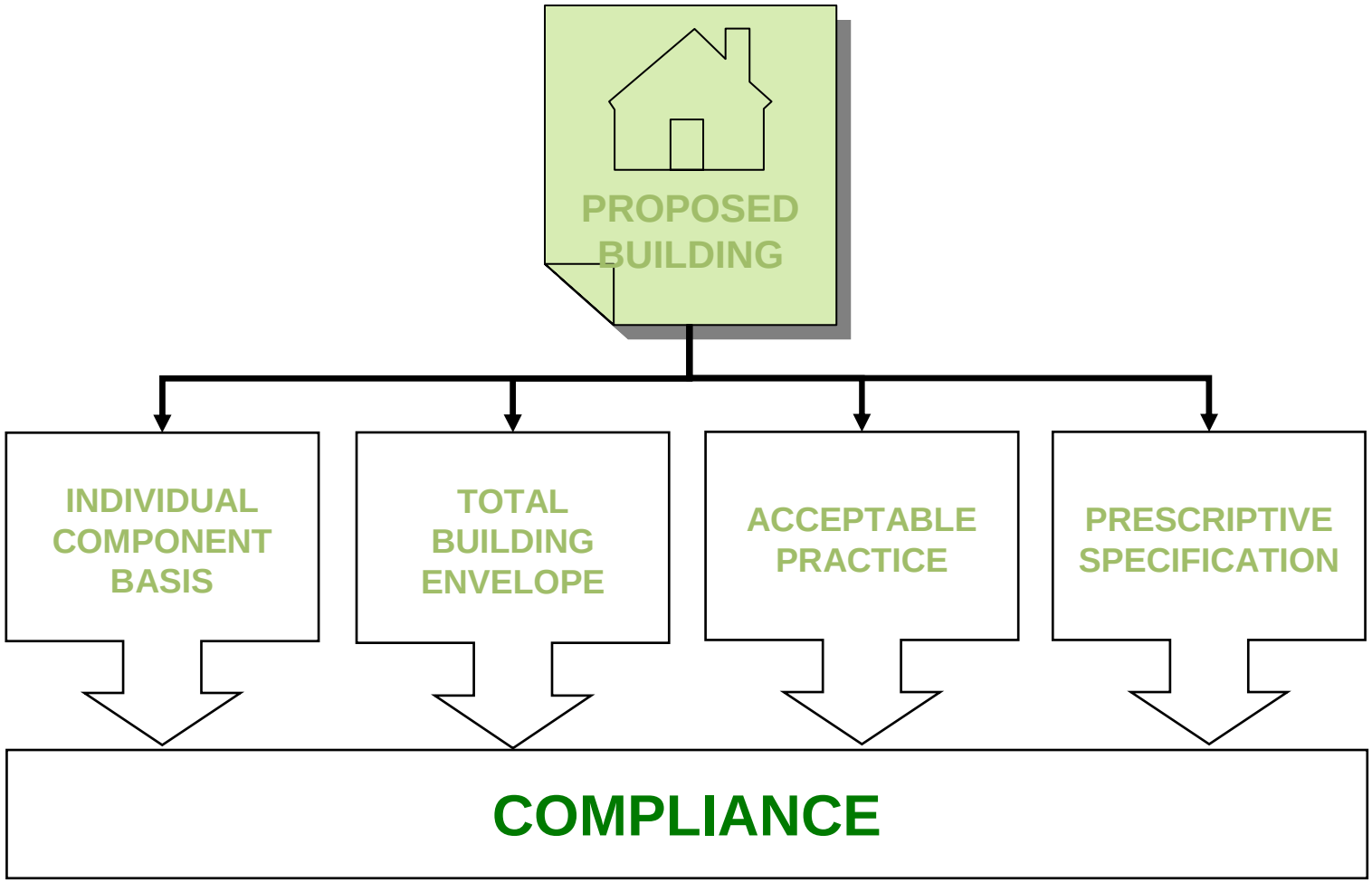
- Window and door assemblies
  - Exception
    - Site-constructed windows and doors
- Caulking and sealants
  - All penetrations to the building envelope shall be sealed, caulked, gasketed, weatherstripped or covered with moisture vapor-impermeable house-wrap

# Areas for Air Leakage

# Fenestration Solar Heat Gain Coefficient
*(Section 502.1.5)*

- Locations with heating degrees days (HDD) < 3,500, the combined solar heat gain coefficient (SHGC) must be < 0.4

# Heating and Cooling Criteria
*(Section 502.2)*

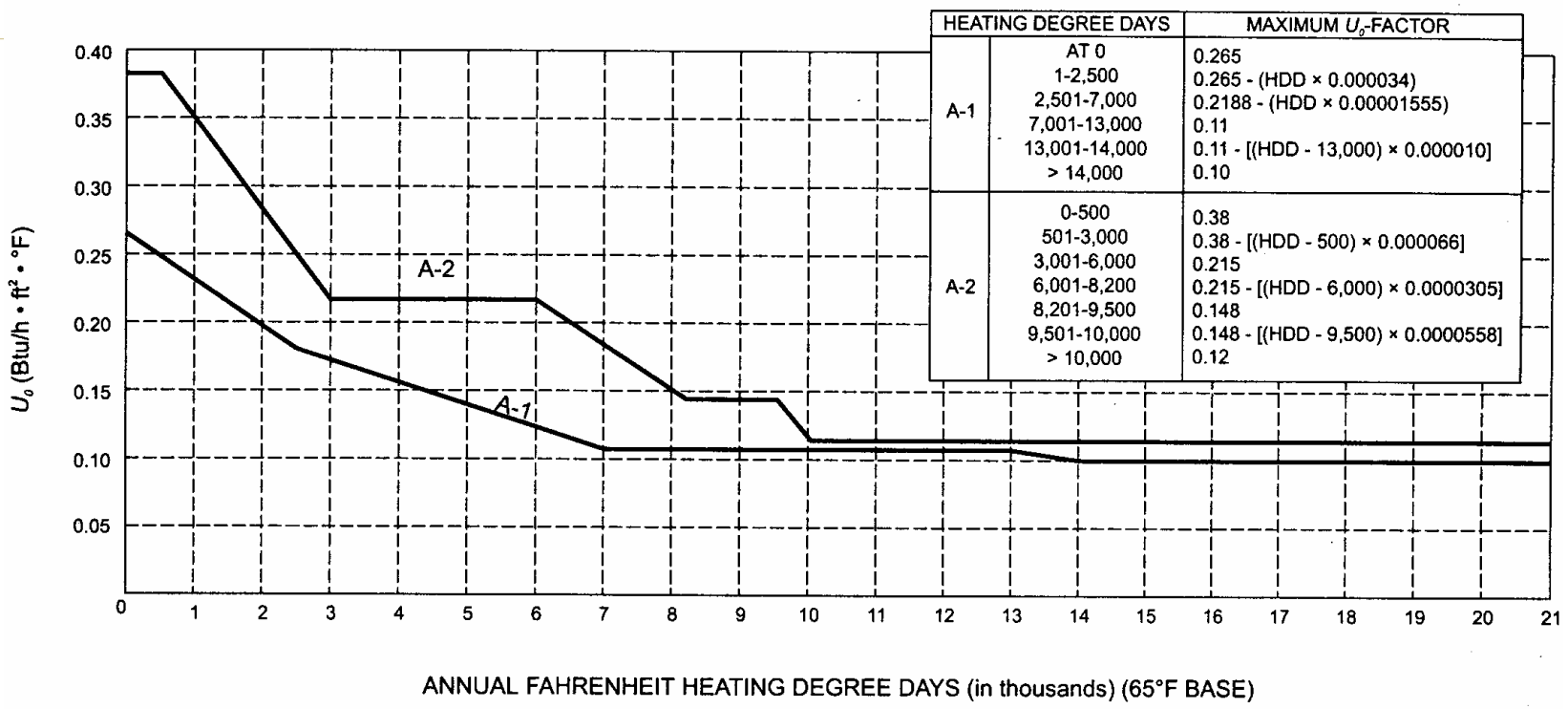


# Compliance by Performance on an Individual Component Basis

- Each component of the building envelope shall meet the provisions of Sections 502.2.1.1 through 502.2.16
  - Walls
  - Roof/ceiling
  - Floors over unheated spaces
  - Slab-on-grade floors
  - Crawl space walls
  - Basement walls

# Walls
*(Section 502.2.1.1)*

- Maximum U-factor from Figure 502.2(1)
- Includes windows
- Steel stud framed walls
  - Require a correction calculation
  - Exception:
    - System tested by approved laboratories
- Mass walls (Tables 502.2.1.1.2(1)-(3))




| HEATING DEGREE DAYS | | MAXIMUM $U_o$-FACTOR |
|---|---|---|
| A-1 | AT 0 | 0.265 |
| | 1-2,500 | 0.265 - (HDD × 0.000034) |
| | 2,501-7,000 | 0.2188 - (HDD × 0.00001555) |
| | 7,001-13,000 | 0.11 |
| | 13,001-14,000 | 0.11 - [(HDD - 13,000) × 0.000010] |
| | > 14,000 | 0.10 |
| A-2 | 0-500 | 0.38 |
| | 501-3,000 | 0.38 - [(HDD - 500) × 0.000066] |
| | 3,001-6,000 | 0.215 |
| | 6,001-8,200 | 0.215 - [(HDD - 6,000) × 0.0000305] |
| | 8,201-9,500 | 0.148 |
| | 9,501-10,000 | 0.148 - [(HDD - 9,500) × 0.0000558] |
| | > 10,000 | 0.12 |

For SI: 1 Btu/h · ft$^2$ · °F = 5.678W/(m$^2$ · K), °C = [(°F)-32]/1.8.

# Roof/Ceiling
*(Section 502.2.1.2)*

- Maximum U-factor from Figure 502.2(2)
  - Skylight shafts 12" or greater shall be insulated:
    - R-13 in climates < 4000 HDD
    - R-19 in climates > 4000 HDD
  - Not included in roof calculation

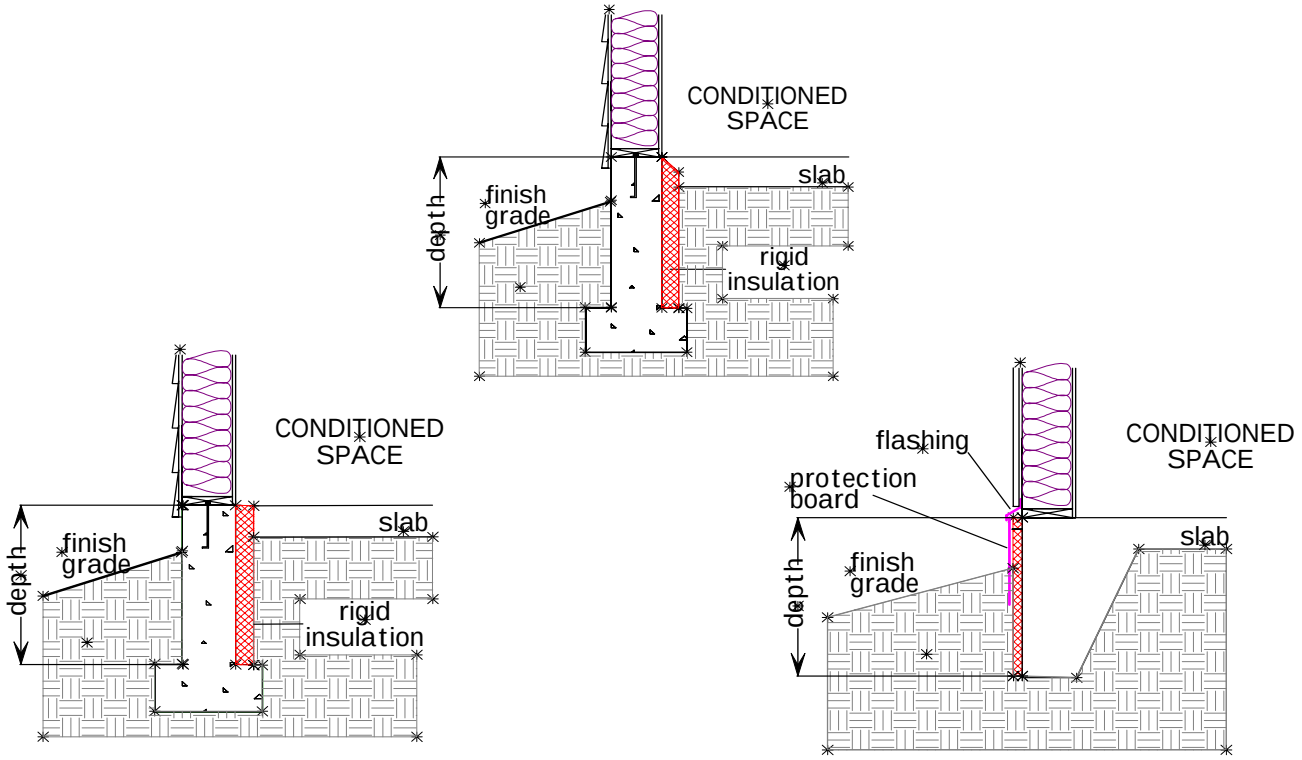
# Floors Over Unheated Spaces
*(Section 502.2.1.3)*

- Floors over unheated spaces
  - Maximum U-factor from Figure 502.2(4)
  - Floors over outside air (overhangs shall use roof/ceiling U-factor)

# Slab-on-Grade Floors
## *(Section 502.2.1.4)*

- Maximum R-value from Figure 502.2(3)
- Climates < 6000 HDD
  - Insulation shall extend downward 24" from the top of the slab or downward from the top of the slab to the bottom of the slab and then horizontally a total of 24"
- Climates ≥ 6000 HDD
  - Insulation shall extend downward 48" from the top of the slab or downward from the top of the slab to the bottom of the slab and then horizontally a total of 48"
- Insulation extending horizontally outside the foundation shall be protected by pavement or a minimum of 10" top soil
- Insulation may be cut at a 45° angle away from the exterior wall

# Slab-edge Insulation Examples



# Crawl Space Walls
*(Section 502.2.1.5)*

- Maximum U-factor from Figure 502.2(5)
- Crawl space shall not be vented to outside air
- If inside ground surface is ≥ 12 in. below outside finished ground level
  - Insulation shall extend from the top of the wall to at least the inside ground surface
- If inside ground surface is < 12 in. below outside finished ground level
  - Insulation shall extend from the top of crawl space wall to the top of the footing

# Basement Walls
*(Section 502.2.1.6)*

- Maximum U-factor from Figure 502.2(6)
- Insulation must be applied from the top of the wall to a depth of 10 feet or the basement floor, whichever is less

# Total Building Envelope Performance
*(Section 502.2.2)*

- The building envelope design is permitted to deviate from U-factors and R-values determined in the "Compliance by Performance on an Individual Component Basis" section provided the total thermal transmittance does not exceed that determined in that section

# Acceptable Practice on an Individual Component Basis
*(Section 502.2.3)*

- Identical to “Compliance by Performance on an Individual Component Basis” method, but using “typical” assembly U-factors and R-values represented in Appendix Tables.

# Prescriptive Specification on an Individual Component Basis *(Section 502.2.4)*

- Prescriptive envelope requirements based upon glazing percent of gross wall area
- Type A-1:
  - 8,12,15,18, 20 and 25% glazing
- Type A-2:
  - 20, 25 and 30% glazing

**TABLE 502.2.4(3)**
**PRESCRIPTIVE BUILDING ENVELOPE REQUIREMENTS, TYPE A-1 RESIDENTIAL BUILDINGS**
**WINDOW AREA 15 PERCENT OF GROSS EXTERIOR WALL AREA**

| HEATING DEGREE DAYS | MAXIMUM | MINIMUM | | | | | |
|---|---|---|---|---|---|---|---|
| | Glazing *U*-factor | Ceiling *R*-value | Exterior wall *R*-value | Floor *R*-value | Basement wall *R*-value | Slab perimeter *R*-value and depth | Crawl space wall *R*-value |
| 0-499 | any | R-13 | R-11 | R-11 | R-0 | R-0 | R-0 |
| 500-999 | 0.90 | R-19 | R-11 | R-11 | R-0 | R-0 | R-4 |
| 1,000-1,499 | 0.75 | R-19 | R-11 | R-11 | R-0 | R-0 | R-5 |
| 1,500-1,999 | 0.75 | R-26 | R-13 | R-11 | R-5 | R-0 | R-5 |
| 2,000-2,499 | 0.65 | R-30 | R-13 | R-11 | R-5 | R-0 | R-6 |
| 2,500-2,999 | 0.60 | R-30 | R-13 | R-19 | R-6 | R-4, 2 ft. | R-7 |
| 3,000-3,499 | 0.55 | R-30 | R-13 | R-19 | R-7 | R-4, 2 ft. | R-8 |
| 3,500-3,999 | 0.50 | R-30 | R-13 | R-19 | R-8 | R-5, 2 ft. | R-10 |
| 4,000-4,499 | 0.45 | R-38 | R-13 | R-19 | R-8 | R-5, 2 ft. | R-11 |
| 4,500-4,999 | 0.45 | R-38 | R-16 | R-19 | R-9 | R-6, 2 ft. | R-17 |
| 5,000-5,499 | 0.45 | R-38 | R-18 | R-19 | R-9 | R-6, 2 ft. | R-17 |
| 5,500-5,999 | 0.40 | R-38 | R-18 | R-21 | R-10 | R-9, 2 ft. | R-19 |
| 6,000-6,499 | 0.35 | R-38 | R-18 | R-21 | R-10 | R-9, 4 ft. | R-20 |
| 6,500-6,999 | 0.35 | R-49 | R-21 | R-21 | R-11 | R-11, 4 ft. | R-20 |
| 7,000-8,499 | 0.35 | R-49 | R-21 | R-21 | R-11 | R-13, 4 ft. | R-20 |
| 8,500-8,999 | 0.35 | R-49 | R-21 | R-21 | R-18 | R-14, 4 ft. | R-20 |
| 9,000-12,999 | 0.35 | R-49 | R-21 | R-21 | R-19 | R-18, 4 ft. | R-20 |

For SI: 1 foot = 304.8 mm.

# Prescriptive Path for Additions and Window Replacements

- Additions < 500 $ft^2$ may meet Table 502.2.5
  - Exception:
    - Skylights shall have a maximum U-factor of 0.50 when installed in climates > 1,999 HDD

# Building Mechanical Systems and Equipment
*(Section 503)*

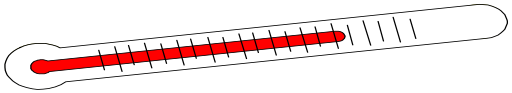
- Mechanical Equipment Efficiency
- Table 503.2

# HVAC Systems
*(Section 503.3)*

- Load Calculations
  - Use design conditions specified in Chapter 3
  - Calculations shall be performed in accordance with ASHRAE *Handbook of Fundamentals* or other equivalent method.
  - Systems shall be sized to meet the load

# Temperature and Humidity Controls
*(Section 503.3.2)*

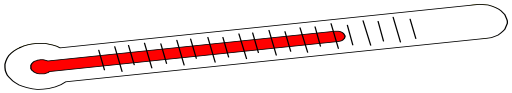
- System Controls *(Section 503.3.2.1)*
  - Each dwelling unit shall be considered a zone and provided with at least one temperature control device
- Thermostatic control capabilities *(Section 503.3.2.2)*



  - Heating only 55°F or lower
  - Cooling only 85°F or higher
  - Both heating and cooling must be capable of a 5° deadband

# Thermostatic Control Capabilities
*(Section 503.3.2.2)*

- Heating only 55°F or lower
- Cooling only 85°F or higher
- Both heating and cooling must be capable of a 5° deadband
- Exceptions:



  - Special occupancy/use as approved by the building official
  - Thermostats that require manual changeover between heating and cooling

# Heat Pump Auxiliary Heat
*(Section 503.3.2.3)*

- Heat pumps with supplementary electric resistance heat shall have controls to prevent heater operation when the load can be met by the heat pump alone (except defrost cycles)

# Humidistat
*(Section 503.3.2.4)*

- Must be capable of being set to prevent the use of fossil fuels or electricity to reduce relative humidity below 60% or increase relative humidity above 30%

# Distribution System
*(Section 503.3.3)*

- Piping Insulation
  - Table 503.3.3.1
- Exceptions
  - Factory installed piping within HVAC equipment
  - Piping that conveys fluids between 55 and 105 °F
  - Piping which conveys fluids which have not been heated or cooled by through the use of fossil fuels or electricity

# Duct and Plenum Insulation
*(Section 503.3.3.3)*

- Table 503.3.3.3
- Exceptions
  - Factory installed plenums, casings or ductwork that is part of the HVAC equipment
  - Ducts within the conditioned space that they serve

# Duct Construction
## *(Section 503.3.3.4)*

- High- and medium-pressure duct systems
  - Shall be leak tested in accordance with SMACNA *HVAC Air Duct Leakage Test Manual*
- Low-pressure duct systems
  - All longitudinal and transverse joints, seams and connections shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastics-plus-embedded-fabric systems or tapes
    - Exceptions:
      - Continuously welded or locking longitudinal joints and seams operating at static pressures < 2inches w.g.

# Sealing Required
*(Section 503.3.3.4.3)*

- Tapes and mastics used with rigid fiberglass ducts shall be listed with UL 181A
- Tapes and mastics used with flexible air ducts shall be listed with UL 181B
- **Cloth type "Duct tape" is not permitted**

# Sealing Examples

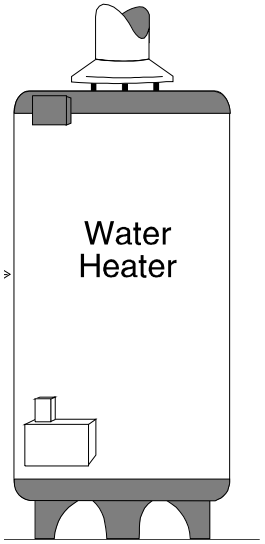
# Mechanical Ventilation
*(Section 503.3.3.5)*

- Systems shall be equipped with a readily accessible shutoff or volume damper and shutoff
- Automatic or gravity dampers shall be used for outdoor intakes and exhausts

# Distribution System *(cont'd)*

- Transport energy *(Section 503.3.3.6)*
  - A measure of proper duct design
  - Air transport factor < 5.5
- Balancing *(Section 503.3.3.7)*
  - HVAC systems shall provide a means for balancing (i.e. dampers, temperature or pressure test connections, balancing valves, etc.)

# Service Water Heating
## *(Section 504)*



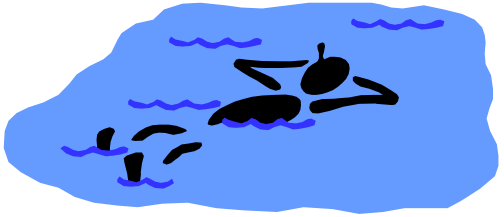
# Water Heaters, Storage Tanks and Boilers
*(Section 504.2)*

- Performance Efficiency *(Section 504.2.1)*
  - Meet efficiency requirements of Table 504.2
  - Exception
    - Storage water heaters and hot water storage tanks >140 gallons need not meet the standby loss requirements provided:
      - Tank surface area is insulated to R-12.5
      - A standing pilot light is <u>not</u> used

# Combination Service Water-Heating/Space Heating Boilers
*(Section 504.2.2)*

- Service water-heating equipment shall not be dependent upon year-round operation of space-heating boilers
- Exceptions
  - Systems with standby loss < eq. 5-12
  - Systems where a single heating unit will save energy

# Swimming Pools
*(Section 504.3)*



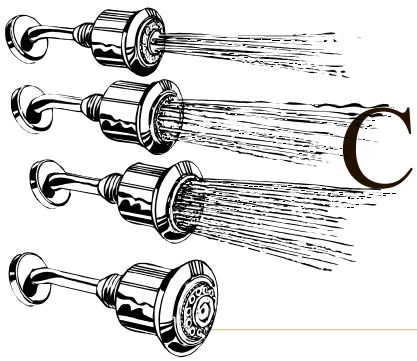
- On-off switch
  - Readily accessible on/off switch without having to adjust thermostat setting or relighting pilot light
- Pool covers
  - Heat pools shall have pool covers
  - Exception:
    - Outdoor pools deriving > 20% of their heating energy from renewable sources
- Time clocks
  - Capable of being set to run off-peak (electric demand)
  - Run the minimum time to maintain sanitary conditions

# Pump Operation
*(Section 504.4)*

- Circulating hot water systems shall be arranged that the circulation pump(s) can be conveniently turned off, automatically or manually, when the hot water system is not in operation

# Pipe Insulation
*(Section 504.5)*

- Recirculating systems
  - Insulated to levels in Table 504.5
  - Exception:
    - Piping insulation is not required when the heat loss, without insulation, does not increase energy use



# Conservation of Hot Water
*(Section 504.6)*

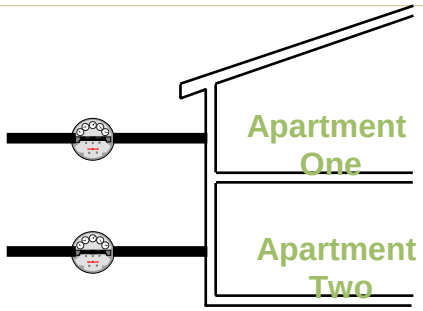
- Showers
  - Showerheads shall have a maximum flow rate of 2.5 gallons per minute (gpm) at a pressure of 80 pounds per square inch (psi)

# Heat Traps
*(Section 504.7)*

- Water heaters with vertical pipe risers shall have a heat trap on both the inlet and outlet of the water heater
  - Exceptions:
    - integral traps
    - part of a circulating system

# Electrical Power and Lighting
## *(Section 505)*

- Electrical energy consumption *(Section 505.1)*
  - Individual dwelling units in Type A-2 (multifamily residential) buildings shall have separate electric meters




- Lighting power budget *(Section 505.2)*
  - Light system shall comply with Section 805
  - Exception:
    - Type A-1 (1 or 2 family) residential buildings
    - Dwelling portion of Type A-2 (multifamily residential) buildings

# Chapter 6

## "Simplified Prescriptive Requirements For Residential Buildings"

- Scope
  - Applies to Type A-1 and A-2 residential buildings
  - Exception
    - Portions of the building envelope that do not enclose conditioned space

# Requirements and Compliance Approaches

- Compliance
- Materials and equipment
- Building envelope thermal performance criteria
- Fenestration requirements
- Mechanical systems
- Service water heating

# Compliance
*(Section 601.2)*

- Residential Buildings, Type A-1
  - Glazing must be less than 15% of gross wall area
  - Must meet requirements of Chapters 4 and 5
- Residential Buildings, Type A-2
  - Glazing must be less than 25% of gross wall area
  - Must meet requirements of Chapters 4 and 5
- Climates > 13,000 HDD must use envelope requirements of Chapters 4 and 5

# Materials and Equipment
*(Section 601.3)*

- Insulation
  - R-value must be visible on all insulation or a certification of the R-value(s) by the insulation installer
  - Blown or Sprayed Walls
    - Certification of installed density and R-value
  - Blown or Sprayed Roof/Ceiling
    - Certification of initial installed thickness, settled thickness, coverage area and # of bags installed
    - Insulation depth markers every 300 $ft^2$

# This Attic Has Been Insulated To

INSULATION CONTRACTORS ICAA ASSOCIATION OF AMERICA

**R-** ☐

## By A Professional Insulation Contractor

The insulation in this attic was installed by a qualified professional Contractor to the R-value stated above

CIMA

Energy EPA DOE INSULATION

INSULATE TODAY SAVE TOMORROW

## Certificate of Insulation

**BUILDING ADDRESS:**

_____

_____

_____

Installation Date: _____

**CONTRACTOR:**

_____

_____

_____

License #: _____

| Area Insulated | R-Value | Installed Thickness | Settled Thickness | Installed Density | No. Bags | Sq. Ft. |
|---|---|---|---|---|---|---|
| **Attic** | | | | | | |
| **Walls** | | | | | | |
| **Floors** | | | | | | |

I, _____, (print name) certify that this residence/building has been insulated to the stated R-value and that the installation is in conformance with all applicable codes, standards, regulations and specifications.

Authorized Signature: _____ Date:_____


R-30
R-38
R-44
R-49
R-60
THIS SIDE DOWN
SPACE PANELS
ENDS & SIDES

# Materials and Equipment *(cont'd)*

- Fenestration
  - U-factors and SHGC shall be rated in accordance with NFRC 100/200, labeled and certified by the manufacturer
  - Fenestration which has not been NFRC rated shall be assigned a default value from Tables 102.5.2(1) through 102.5.2(3)
- Maintenance
  - Mechanical or plumbing equipment requiring maintenance shall have requirements clearly labeled on the equipment

# Thermal Performance Criteria
*(Section 602.1)*

- The minimum required R-value or maximum required U-value for each element of the thermal envelope shall meet Table 602.1
- If any one element does not meet the minimum specified, then you automatically must use Chapter 4 or 5 to demonstrate compliance

**TABLE 602.1**
**SIMPLIFIED PRESCRIPTIVE BUILDING ENVELOPE THERMAL COMPONENT CRITERIA**
**MINIMUM REQUIRED THERMAL PERFORMANCE (*U*-FACTOR AND *R*-VALUE)**

| | Maximum | Minimum | | | | | |
|---|---|---|---|---|---|---|---|
| HEATING DEGREE DAYS | Glazing *U*-factor | Ceiling *R*-value | Wall *R*-value | Floor *R*-value | Basement wall *R*-value | Slab perimeter *R*-value and depth | Crawl space wall *R*-value |
| 0-499 | Any | R-13 | R-11 | R-11 | R-0 | R-0 | R-0 |
| 500-999 | 0.90 | R-19 | R-11 | R-11 | R-0 | R-0 | R-4 |
| 1,000-1,499 | 0.75 | R-19 | R-11 | R-11 | R-0 | R-0 | R-5 |
| 1,500-1,999 | 0.75 | R-26 | R-13 | R-11 | R-5 | R-0 | R-5 |
| 2,000-2,499 | 0.65 | R-30 | R-13 | R-11 | R-5 | R-0 | R-6 |
| 2,500-2,999 | 0.60 | R-30 | R-13 | R-19 | R-6 | R-4, 2 ft. | R-7 |
| 3,000-3,499 | 0.55 | R-30 | R-13 | R-19 | R-7 | R-4, 2ft. | R-8 |
| 3,500-3,999 | 0.50 | R-30 | R-13 | R-19 | R-8 | R-5, 2 ft. | R-10 |
| 4,000-4,499 | 0.45 | R-38 | R-13 | R-19 | R-8 | R-5, 2 ft. | R-11 |
| 4,500-4,999 | 0.45 | R-38 | R-16 | R-19 | R-9 | R-6, 2 ft. | R-17 |
| 5,000-5,499 | 0.45 | R-38 | R-18 | R-19 | R-9 | R-6, 2 ft. | R-17 |
| 5,500-5,999 | 0.40 | R-38 | R-18 | R-21 | R-10 | R-9, 4 ft. | R-19 |
| 6,000-6,499 | 0.35 | R-38 | R-18 | R-21 | R-10 | R-9, 4 ft. | R-20 |
| 6,500-6,999 | 0.35 | R-49 | R-21 | R-21 | R-11 | R-11, 4 ft. | R-20 |
| 7,000-8,499 | 0.35 | R-49 | R-21 | R-21 | R-11 | R-13, 4 ft. | R-20 |
| 8,500-8,999 | 0.35 | R-49 | R-21 | R-21 | R-18 | R-14, 4 ft. | R-20 |
| 9,000-12,999 | 0.35 | R-49 | R-21 | R-21 | R-19 | R-18, 4 ft. | R-20 |

For SI: 1 foot = 304.8 mm.

Thermal Performance Criteria

# Exterior Walls

*(Section 602.1.1)*

- The sum of the cavity and insulating sheathing shall meet the minimum required R-value (no credit for air films, drywall, siding, etc.)
- Mass Walls
  - Mass walls with exterior or integral insulation must meet Table 602.1.1.1(1)
  - "Other Mass Walls" must use Table 602.1.1.1(1), but the R-values used to calculate the assembly must come from Table 602.1.1.1(2)

Thermal Performance Criteria

# Mass Walls

*(Section 602.1.1.1)*

- Mass walls with exterior or integral insulation must meet Table 602.1.1.1(1)
- "Other Mass Walls" must use Table 602.1.1.1(1), but the R-values used to calculate the assembly must come from Table 602.1.1.1(2)

Thermal Performance Criteria

# Steel Frame Walls

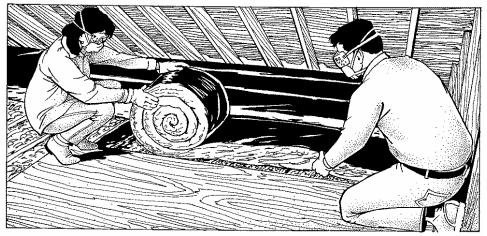
*(Section 602.1.1.2)*

– Steel frame walls shall meet Table 602.1.1.2

**TABLE 602.1.1.2**
**STEEL-FRAME WALL MINIMUM PERFORMANCE REQUIREMENTS (*R*-VALUE)**

| HDD | EQUIVALENT STEEL-FRAME WALL CAVITY AND SHEATHING *R*-VALUE[a] |
|---|---|
| 0-1,999 | R-11+R-5, R-15+R-4, R-21+R-3 |
| 2,000-3,999 | R-11+R-5, R-15+R-4, R-21+R-3 |
| 4,000-5,999 | R-11+R-9, R-15+R-8, R-21+R-7 |
| 6,000-8,499 | R-13+R-10, R-19+R-9, R-25+R-8 |
| 8,500-12,999 | R-13+R-10, R-19+R-9, R-25+R-8 |

a. The cavity insulation *R*-value requirement is listed first, followed by the sheathing *R*-value requirement.



Thermal Performance Criteria

# Ceilings

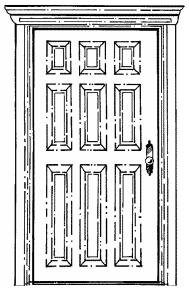
*(Section 602.1.2)*

- The R-value stated in Table 602.1 assumes standard truss or rafter construction
- If a construction technique is used to obtain the required R-value over the top plate:
  - R-30 may be used where R-38 is required
  - R-38 may be used where R-49 is required

# Raised Trusses

Thermal Performance Criteria

# Opaque Doors and Floor



- Opaque Doors *(Section 602.1.3)*
  - Maximum U-factor of 0.35
  - One (1) door may be exempt (i.e., wood door)
- Floor *(Section 602.1.4)*
  - Must meet Table 602.1
    - Except any individual floor assembly with > 25% of its area exposed to outside air, must meet the "Ceiling R-value"

Thermal Performance Criteria

# Basement Walls

*(Section 602.1.5)*

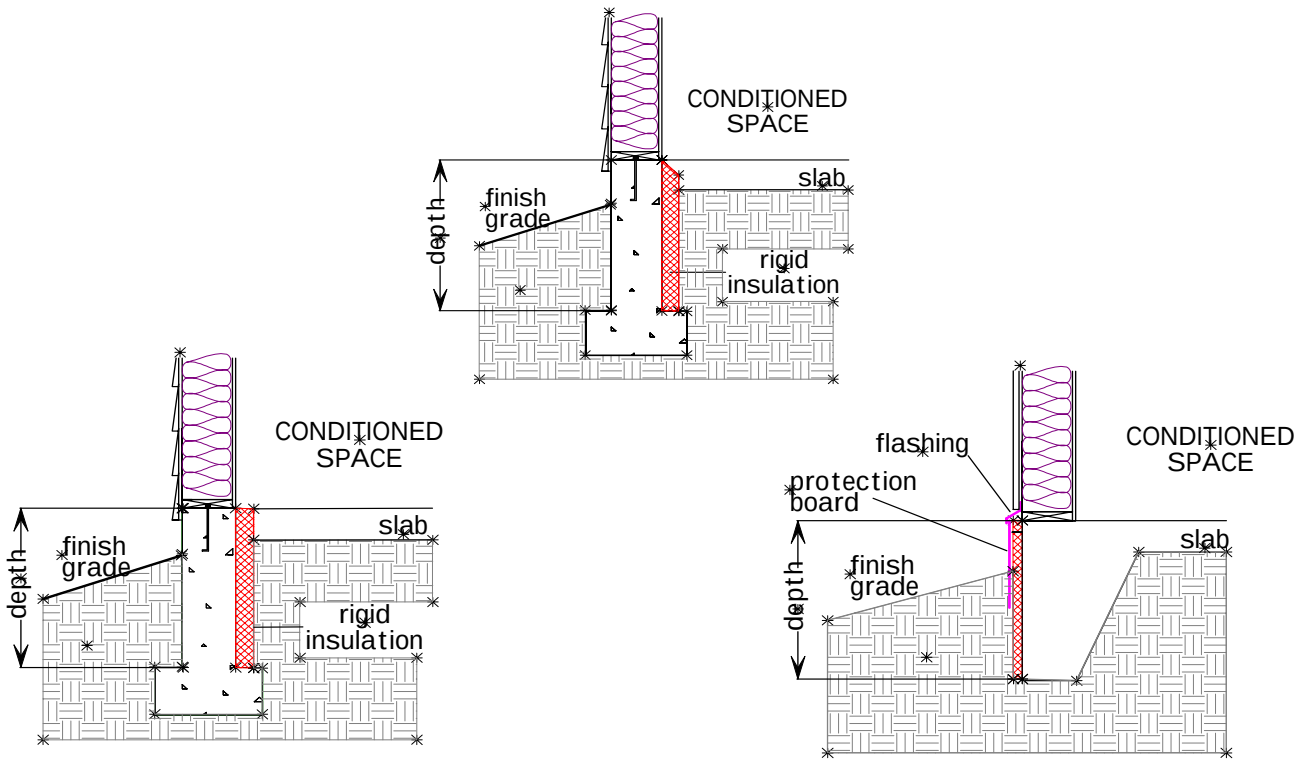
- If basement is conditioned, walls must meet the levels specified in Table 602.1
- If basement is unconditioned, walls or the basement ceiling must meet the levels specified in Table 602.1
- Where basement walls are insulated, the insulation must be applied from the top of the wall to a depth of 10 feet or the basement floor

Thermal Performance Criteria

# Slab-On-Grade Floors

*(Section 602.1.6)*

- For slabs < 12" below grade, the insulation shall:
  - be installed inside or outside the foundation wall
  - extend downward from the top the slab or downward from the top of the slab to the bottom of the slab and then horizontally the combined distance specified in Table 602.1
- Insulation may be cut at a 45° angle away from the exterior wall


CONDITIONED
SPACE
slab
finish
grade
depth
rigid
insulation
CONDITIONED
SPACE
slab
finish
grade
depth
rigid
insulation
flashing
protection
board
CONDITIONED
SPACE
slab
finish
grade
depth

Thermal Performance Criteria

# Slab-On-Grade Floors *(cont'd)*

- Insulation extending horizontally outside the foundation shall be protected by pavement or a minimum of 10" top soil
- Locations > 500 HDD shall add R-2 to "Slab perimeter R-value" where the slab contains:
  - uninsulated hot water pipes
  - air distribution ducts
  - electric heating cables

Thermal Performance Criteria

# Slab-On-Grade Floors *(cont'd)*

- Exception:
  - Slab insulation is not required in areas with heavy termite infestation (See Table 502.2(7))
  - **If this exception is taken, you must now use Chapter 4 or 5 if your location has > 2500 HDD**

Thermal Performance Criteria

# Crawl Space Walls

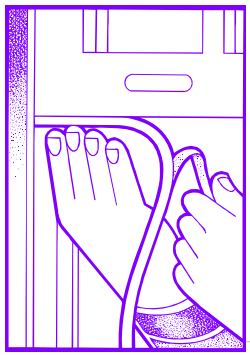
*(Section 602.1.7)*

- Crawl space shall not be vented to outside air
- Insulation shall be applied downward from the sill plate to the exterior finished grade and then vertically and/or horizontally a total of 24"
- 1.0 perm or less continuous vapor retarder shall be applied over exposed earth

Thermal Performance Criteria

# Masonry Veneer and Protection

- Masonry Veneer *(Section 602.1.8)*
  - Exterior foundation insulation is not required on the horizontal portion supporting masonry veneer
- Protection *(Section 602.1.9)*
  - Exposed insulation shall have a protective covering which extends 6" below grade

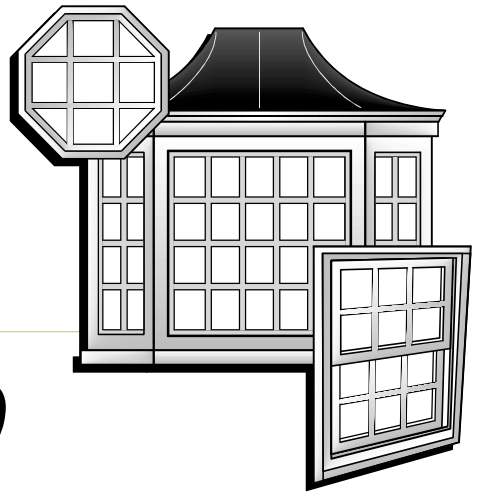


Thermal Performance Criteria

# Caulking, Sealing and Gasketing
*(Section 602.1.10)*

- All penetrations to the building envelope shall be caulked, gasketed, weatherstripped, wrapped, or otherwise sealed to limit uncontrolled air movement

# Fenestration



- Maximum SHGC *(Section 602.2)*
  - In locations with < 3,500 HDD, the area weighted average SHGC shall be < 0.4
- Fenestration Exemption *(Section 602.3)*
  - Up to 1% of the total glazing area may be exempt from the “Glazing U-factor”

# Replacement Fenestration
*(Section 602.4)*

- Where entire window assemblies are replaced, new fenestration must meet Table 602.1
  - Exception:
    - In locations > 1900 HDD, replacement skylights shall have a maximum U-factor of 0.50

# Mechanical Systems
*(Section 603.1)*

- Heating and air-conditioning equipment and appliances shall comply with Section 503

# Service Water Heating
*(Section 604.1)*

- Water-heating equipment and appliances shall comply with Section 504

# Where to Get More Information

- Other training sessions
- MEC*check*™
- List books, articles, electronic sources
  - www.energycodes.org
  - www.boca.org
  - www.icbo.org
  - www.sbcci.org
  - Hotline: 1-800-270-CODE